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THE SPECIES QUESTION RE-OPENED.

The Making of Species. By Douglas Dewar and Frank Finn. Pp. xix+400; 15 illustrations. (London: John Lane, 1909.) Price 7*s.* 6*d.*

IF this work fails to bring about that revolution in biological science which its announcement led us to expect, it is not for lack of confidence on the part of the authors or their publisher. We were informed (by advertisement) that with the exception of a certain well-known treatise by de Vries this book was "the most important contribution to biological science which has appeared since Darwin's 'Origin of Species.'" We were further told that "the authors have no difficulty in demolishing some of the theories which are most cherished by biologists of to-day—notably those of mimicry and recognition markings in birds," and that "the facts which they have brought together undermine the whole of the massive superstructure which Neo-Darwinians have erected on the foundation of the theory of natural selection." A few extracts from the preface will suffice to reveal the tone which pervades this latest attack upon the theory of natural selection:—

"We fear that this book will come as a rude shock to many scientific men. . . . We are endeavouring to save biology in England from committing suicide, to save it from the hands of those into which it has fallen. . . . The Wallaceians (*sic*) continue on their course and give to the world a spurious Darwinism . . . we were both of opinion that biology is in an unhealthy condition, especially in England, and that the science sorely needs some fresh impetus."

After such a flourish of trumpets we naturally turn eagerly to the text for the "fresh impetus," but fail to find inspiration. There are many gibes aimed at and epithets attached to "Wallaceians" and "Neo-Darwinians," and there are some very remarkable perversions of the history of organic evolution. The authors set out, in fact, with an attempt to explain the reasons why the "Origin of Species" was accorded a "rapturous welcome . . . by the more progressive biologists," and how

"the man in the street was able to comprehend the theory of natural selection. This was greatly in its favour. Men are usually well disposed towards doctrines which they can readily understand."

Those who are familiar with the history of the publication of Darwin's great work and the difficulty which he experienced in making even the expert naturalists of his time fully grasp the principles of the selection theory will wonder from what source the authors have derived their information. As another example of historical perversion, attention may be directed to the statement (p. 198)

"that all the opposition to the theory of protective colouration comes from those who observe nature first hand, while the warmest supporters of the theory are cabinet naturalists and museum zoologists."

From this the reader will infer that the founders of that theory, Bates and Wallace, Trimen, Belt, Fritz Müller and Weismann, were not, in the judgment of the authors, observers of nature at first hand.

Within the limits of an ordinary review in these columns it is impossible to discuss in any detail the large body of evidence which the authors bring together in order to "demolish" those whom they dub "Neo-Darwinians," "Wallaceians," or even, when their scorn reaches its highest pitch, "Neo-Wallaceians." The general drift of the work is purely destructive, and its main object is apparently to disprove the all-sufficiency of natural selection. There is nothing very novel in this position, and by attributing to the followers of Darwin and Wallace a highly exaggerated and super-exalted doctrine, which no Darwinian has ever upheld, such refutation is naturally a very simple matter. The authors appear to imagine, for example, that somebody holds the belief that the theory of natural selection has been seriously held "to explain all the varied phenomena of nature" (p 28). Of course, the very obvious and flagrant cases of adaptational colouring coming under the designations "protective resemblance" and "mimicry," which have generally been looked upon as reasonably explicable on Darwinian principles, come in for a large share of attention, and here is the verdict with respect to these theories:—

"We have examined these mighty images of gold, silver, and brass and iron, and found that there is much clay in the feet. We shall devote this chapter to lifting the hem of the garment of sanctity that envelops each of these images, and so expose to view the clay that lies concealed" (p. 172).

It must be left to the reader, whose flesh has been made to creep by this preliminary threat, to find out how far the authors have succeeded in damaging the evidence which has been accumulated by the joint labours of some of the most acute observers of nature ("at first hand"!) since Darwin gave us the key to the explanation of the phenomena in question, half a century ago. Prof. Poulton, as one of the most prominent of recent workers in this field, comes in for much castigation. The methods of demolition adopted by the authors have been made quite familiar by anti-Darwinians ever since the publication of Mivart's "Genesis of Species." Cases of convergent characters which are non-mimetic are marshalled against the selection theory of mimicry, the facts of mimicry are altogether denied or said to be much exaggerated, and cases of obvious adaptation, such as Kallima, are said (virtually) to be too good to be true, or, in other words, that the imitation is elaborated to an unnecessary extent.

It will naturally be asked whether this great array of objections and difficulties is a purely destructive attack, or whether it is a prelude to some great constructive generalisation. The reader who looks for new light will, we fear, be disappointed, judging from the following specimen of an "explanation" of the mimicry of butterflies by diurnal moths:—

"When two species adopt the same method of obtaining food, it not infrequently happens that a professional likeness springs up between them" (p. 250).

In so far as there is any positive declaration to be found in the volume the authors may be classified with the "mutationists." They are at great pains, in fact, to define their precise position as members of that school "of which Bateson, de Vries, Kellog, and T. H. Morgan appear to be adherents" (p. 26). They state further that, "like Darwin," they "welcome all factors which appear to be capable of effecting evolution" (p. 27). What these factors are beyond natural selection (to which they assign some value) it is not quite easy to gather from the present work. Isolation, correlation, variation, and heredity have been considered very seriously by all evolutionists from Darwin down to the present time, and it cannot be said that Messrs. Dewar and Finn have shed any new light on these subjects. They tell us (p. 387) that species are made by

"the inherent properties of protoplasm and the laws of variation and heredity. These determine the nature of the organism; natural selection and the like factors merely decide for each particular organism whether it shall survive and give rise to a species."

This will seem to the reader who is not a "mutationist" to be very like pure Darwinism with a dash of "inherent properties of protoplasm" thrown in. The introduction of "biological molecules," which are defined (pp. 157–9) as the units of which the germ cell is composed, may be considered as the substitution of a vague conception for the very definite mechanism which has been introduced into the theories of heredity associated with the names of Darwin, Herbert Spencer, Weismann, Mendel, and others. One example of the use of this conception will suffice to show its vagueness:—

"Thus the phenomena of 'mimicry' and 'reversion' are, we believe, due to the fact that in the fertilised egg of both the pattern and its copy a similar arrangement of biological molecules obtains. If we regard the sexual act as resembling in many respects a chemical synthesis, the phenomenon need not surprise us" (p. 293).

The reasons for associating mimicry with reversion and sexual reproduction are not very obvious, even from the authors' own point of view. Dealing with the first set of phenomena only, if the "explanation" means that in a mimic and its model the similarity of colour and pattern is due to an identity either of physical structure or chemical constitution, or of both, it is untrue in fact. If it means that the resemblance has arisen because the units (*i.e.* "biological molecules") of which the ovum is in each case composed give rise to a similarity of colour and pattern on development, this appears to be a mere paraphrase of the description of the facts and no explanation at all.

It is to be regretted that Messrs. Dewar and Finn have made this aggressive incursion into the domain of biological theory. They are favourably known as popular writers on Indian ornithology and other natural-history subjects. Although in the present volume none of the objections brought against natural selection are new in principle, it must be placed to the credit of the authors that, unlike so many of the earlier critics of Darwin's work, they are able to give a certain number of illustrations derived from personal observation and experience. But the work as a whole will not add to their reputation; with the majority of readers it will probably have the reverse effect. If the general object of the book is simply to emphasise the point that the theory given to science by Darwin and Wallace need not arrest further research in the domain of bionomics, there will be a very general unanimity among workers of all schools as to the soundness of their contention. But if the authors attribute any neglect, real or imaginary, of the study of bionomics to the direct influence of the teachings of Darwin and Wallace and their followers, they are inverting the truth. No greater stimulus was ever given to research in this domain than that given by the theory of natural selection. Any neglect with which English biologists can be charged is due to their ignoring and not to their acceptance of the teachings of the founders of that theory. R. MELDOLA.

THE GEOGRAPHICAL DISTRIBUTION OF LEPIDOPTERA.

Die geographische Verbreitung der Schmetterlinge. By Dr. Arnold Pagenstecher. Pp ix+451. (Jena: G. Fischer, 1909.) Price 11 marks.

THE author of this work is one of the older German entomologists, who has been working for many years in the formation of a collection of Lepidoptera, and has published many valuable lists and monographs of the species found in various limited regions. He has now utilised his materials in a work which cannot fail to be interesting, not only to entomologists, but also to all naturalists who direct their attention to the numerous problems connected with the present geographical distribution of animals over the surface of the globe.

Dr. Pagenstecher remarks that the geographical distribution of Lepidoptera, like that of plants, is closely connected with certain physical and organic factors. The most important physical factors are (1) soil; (2) temperature and light; (3) moisture; (4) atmospheric conditions. The first portion of this work is therefore devoted to general observations on the geographical conditions of the continents, and the influence of mountains, desert or fruitful plains, the neighbourhood of rivers and seas, continental and oceanic islands, &c., on distribution. The influence of temperature, moisture, atmosphere, &c., is then briefly described; then vegetation, carnivorous habits, commensalism, &c. This is followed by sections on the distribution of Lepidoptera as affected by altitude, notes on migration, cosmopolitan species, and season-dimorphism and local variation. After this, the organic (physiological) factors of the subject are discussed, with special reference to former geological and climatic conditions, and some reference to fossil Lepidoptera. After some remarks on structure, and on the enemies of Lepidoptera, the section concludes with a summary of the Macro-lepidoptera of Central Europe (1626 species, according to Lampert), and a table of the species of Papilio found in the more important districts of the world.

The second section of the work is devoted to the